# Prevention of Significant Air Quality Deterioration Review

# Preliminary Determination

March 2010

Facility Name: Vogtle Electric Generating Plant
City: Waynesboro
County: Burke
AIRS Number: 04-13-033-00030
Application Number: 18986
Date Application Received: May 27, 2009

Review Conducted by:
State of Georgia - Department of Natural Resources
Environmental Protection Division - Air Protection Branch
Stationary Source Permitting Program

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| Prepared by:<br><br>Bradley Belflower – Combustion Permitting Unit |
| Modeling Approved by:<br><br>Yan Huang - Data and Modeling Unit |
| Reviewed and Approved by:<br><br>John Yntema – Combustion Permitting Unit Coordinator<br><br>Eric Cornwell – Stationary Source Permitting Program Manager<br><br>James A. Capp – Chief, Air Protection Branch |

## SUMMARY

The Environmental Protection Division (EPD) has reviewed the application submitted by Vogtle Electric Generating Plant (Plant Vogtle) for a permit to construct and operate equipment to support new nuclear Units 3 and 4. The proposed project will install 4 cooling towers and 13 diesel engines with diesel fuel storage tanks. The new emission units are supplemental equipment used in the operational and safety systems of the nuclear units. The electricity provided to the grid is exclusively provided by the nuclear power generating units. The existing emission units are not being modified. The nuclear units are subject to review and licensing by the U.S. Nuclear Regulatory Commission (NRC) and not by the Georgia Environmental Protection Division; therefore, the nuclear units are not discussed in detail in this Preliminary Determination.

The proposed project will result in an increase in emissions from the facility. The sources of these increases in emissions include the Standby Generators (Source Codes: VD05 through VD08), the RWS Standby Generator (Source Code: ODG1), the TSC Standby Generator (Source Code: ODG2), the Ancillary Generators (Source Codes: AUX1 through AUX4), the Emergency Fire Pumps (Source Codes: FPD3 through FPD5), Service Water System Cooling Towers (Source Codes: SWS1 and SWS2), and Circulating Water Cooling Towers (Source Codes: CWT1 and CWT2).

The modification of Plant Vogtle due to this project will result in an emissions increase in nitrogen oxides ($NO_x$), sulfur dioxide ($SO_2$), carbon monoxide (CO), volatile organic compounds (VOC), particulate matter (PM), $PM_{10}$, and $PM_{2.5}$. A Prevention of Significant Deterioration (PSD) analysis was performed for the facility for all pollutants to determine if any increase was above the "significance" level. The $NO_x$, CO, VOC, PM, $PM_{10}$, and $PM_{2.5}$ emissions increases were above the PSD significant level threshold.

Plant Vogtle is located in Burke County, which is classified as "attainment" or "unclassifiable" for $SO_2$, $PM_{2.5}$ and $PM_{10}$, $NO_X$, CO, and ozone (VOC).

The EPD review of the data submitted by Plant Vogtle related to the proposed modifications indicates that the project will be in compliance with all applicable state and federal air quality regulations.

It is the preliminary determination of the EPD that the proposal provides for the application of Best Available Control Technology (BACT) for the control of $NO_x$, CO, VOC, PM, and $PM_{10}$, as required by federal PSD regulation 40 CFR 52.21(j).

It has been determined through approved modeling techniques that the estimated emissions will not cause or contribute to a violation of any ambient air standard or allowable PSD increment in the area surrounding the facility or in Class I areas located within 200 km of the facility. It has further been determined that the proposal will not cause impairment of visibility or detrimental effects on soils or vegetation. Any air quality impacts produced by project-related growth should be inconsequential.

This Preliminary Determination concludes that an Air Quality Permit should be issued to Plant Vogtle for the modifications necessary to construct and operate 4 cooling towers and 13 diesel engines to support new nuclear Units 3 and 4. Various conditions have been incorporated into the current Title V operating permit to ensure and confirm compliance with all applicable air quality regulations. A copy of the draft permit amendment is included in Appendix A. This Preliminary Determination also acts as a narrative for the Title V Permit.

# 1.0 INTRODUCTION – FACILITY INFORMATION AND EMISSIONS DATA

On May 27, 2009, Vogtle Electric Generating Plant (hereafter Plant Vogtle) submitted an application for an air quality permit to construct and operate 4 cooling towers and 13 diesel engines to support new nuclear Units 3 and 4. The facility is located at 7821 River Road in Waynesboro, Burke County.

**Table 1-1: Title V Major Source Status**

| Pollutant | Is the Pollutant Emitted? | If emitted, what is the facility's Title V status for the Pollutant? | | |
|---|---|---|---|---|
| | | Major Source Status | Major Source Requesting SM Status | Non-Major Source Status |
| PM | ✓ | ✓ | | |
| $PM_{10}$ | ✓ | ✓ | | |
| $SO_2$ | ✓ | | | ✓ |
| VOC | ✓ | | | ✓ |
| $NO_x$ | ✓ | ✓ | | |
| CO | ✓ | ✓ | | |
| TRS | N/A | | | |
| $H_2S$ | N/A | | | |
| Individual HAP | ✓ | | | ✓ |
| Total HAPs | ✓ | ✓ | | |

Table 1-2 below lists all current Title V permits, all amendments, 502(b)(10) changes, and off-permit changes, issued to the facility, based on a review of the "Permit" file(s) on the facility found in the Air Branch office.

**Table 1-2: List of Current Permits, Amendments, and Off-Permit Changes**

| Permit Number and/or Off-Permit Change | Date of Issuance/ Effectiveness | Purpose of Issuance |
|---|---|---|
| 4911-033-0030-V-02-0 | 3/21/06 | First renewal Title V permit |
| 4911-033-0030-V-02-1 | 9/28/06 | Installation of a temporary boiler |
| 4911-033-0030-V-02-2 | 3/27/07 | Installation of a temporary boiler |

Based on the proposed project description and data provided in the permit application, the estimated incremental increases of regulated pollutants from the facility are listed in Table 1-3 below:

**Table 1-3: Emissions Increases from the Project**

| Pollutant | Potential Emissions Increase (tpy) | PSD Significant Emission Rate (tpy) | Subject to PSD Review |
|---|---|---|---|
| PM | 54.9 | 25 | **Yes** |
| $PM_{10}$ | 54.9 | 15 | **Yes** |
| VOC | 77.7 | 40 | **Yes** |
| $NO_X$ | 427.5 | 40 | **Yes** |
| CO | 788.5 | 100 | **Yes** |
| $SO_2$ | 1.5 | 40 | No |
| TRS | 0 | 10 | No |
| Pb | 0 | 0.6 | No |
| Fluorides | 0 | 3 | No |
| $H_2S$ | 0 | 10 | No |
| SAM | 0 | 7 | No |

The emissions calculations for Table 1-3 can be found in detail in the facility's PSD application (see Section 3.0 of Application No. 18986). These calculations have been reviewed and approved by the Division. Based on the information presented in Table 1-3, Plant Vogtle's proposed modification, as specified per Georgia Air Quality Application No. 18986, is classified as a major modification under PSD because the potential emissions of $NO_x$, CO, VOC, PM, and $PM_{10}$ exceed the PSD significance levels.

Any hours of operation limits for the diesel-fired engines at Plant Vogtle must be reviewed and approved by the U.S. NRC as part of the licensing requirements. Plant Vogtle's NRC operating license does not contain any limits on operating hour for these engines. The emissions listed in Table 1-3, therefore, are based on 8,760 hours of operation per year. Sections 2.2.2 and 2.2.3 of the permit application describes when these engines will be used. Except for loss of onsite power or a fire, the engines will only be operated for testing purposes. Sections 2.2.2 and 2.2.3 also lists the maximum expected operating hours based on non-emergency operation. The maximum expected operating hours are 100 hours per year for the Standby Generators (Source Codes: VD05 through VD08), the RWS Standby Generator (Source Code: ODG1), and the TSC Standby Generator (Source Code: ODG2); 200 hours per year for the Ancillary Generators (Source Codes: AUX1 through AUX4); and 20 hours per year for the Emergency Fire Pumps (Source Codes: FPD3 through FPD5). Table 1-4 contains the emissions from these engines based on the maximum expected operation and based on a "conservative" 500 hours per year per engine.

**Table 1-4: Emissions Increases from the Project Assuming Limited Operating Hours**

| Pollutant | Potential Emissions – Maximum Expected Operation (tpy) | Potential Emissions – 500 hour per year (tpy) | PSD Significant Emission Rate (tpy) |
|---|---|---|---|
| PM* | 16.9 | 18.7 | 25 |
| $PM_{10}$* | 16.9 | 18.7 | 15 |
| VOC | 1.0 | 4.8 | 40 |
| $NO_X$ | 5.0 | 24.4 | 40 |
| CO | 9.9 | 49.2 | 100 |
| $SO_2$ | 0.02 | 0.1 | 40 |

* PM and PM10 includes 16.5 tons per year from Cooling Towers (Source Codes: SWS1, SWS2 CWT1, and CWT2).

Through its new source review procedure, EPD has evaluated Plant Vogtle's proposal for compliance with State and Federal requirements. The findings of EPD have been assembled in this Preliminary Determination.

## 2.0 PROCESS DESCRIPTION

According to Application No. 18986, Plant Vogtle has proposed to install equipment to support new nuclear Units 3 and 4. The support equipment includes 13 diesel-fired engines; four 5560 kW Standby Generators (VD05 through VD08), four 75 kW Ancillary Generators (AUX1 through AUX4), three 168 kW Emergency Fire Pumps (FPD3 through FPD5), and two 1500 kW Standby Generators (Raw Water System, ODG1, and Technical Support Center, ODG2). The 13 diesel-fired engines will be subject to New Source Performance Standard 40 CFR 60 Subpart IIII and National Emission Standard for Hazardous Air Pollutants 40 CFR 63 Subpart ZZZZ. Twelve diesel fuel storage tanks will be constructed to supply the 13 diesel engines. Two natural draft cooling towers, one for each unit, will cool water in the Circulating Water System, and two mechanical draft cooling towers, one for each unit, will cool water in the Service Water System.

The diesel-fired engines in this project are for use in emergency situations. The engines will only be run for testing purposes and during "emergency" situations such as loss of onsite power or for fire-fighting. Under Plant Vogtle's license from the U.S. NRC, the permit cannot contain limits on hours of operation to these "emergency" levels.

The Plant Vogtle permit application and supporting documentation are included in Appendix A of this Preliminary Determination and can be found online at www.georgiaair.org/airpermit.

## 3.0 REVIEW OF APPLICABLE RULES AND REGULATIONS

### State Rules

**Georgia Rule for Air Quality Control (Georgia Rule) 391-3-1-.03(1), Construction Permit,** requires that any person prior to beginning the construction or modification of any facility which may result in an increase in air pollution shall obtain a permit for the construction or modification of such facility from the Director upon a determination by the Director that the facility can reasonably be expected to comply with all the provisions of the Act and the rules and regulations promulgated thereunder. Georgia Rule 391-3-1-.03(8)(b) continues, stating that no permit to construct a new stationary source or modify an existing stationary source shall be issued unless such proposed source meets all the requirements for review and for obtaining a permit prescribed in Title I, Part C of the Federal Act [i.e., Prevention of Significant Deterioration of Air Quality (PSD)], and Section 391-3-1-.02(7) of the Georgia Rules (i.e., PSD).

**Georgia Rule 391-3-1-.02(2)(b), Visible Emissions,** limits the opacity of visible emissions from any air contaminant source, which is subject to some other emission limitation under 391-3-1-.02(2). The opacity of visible emissions from regulated sources may not exceed 40 percent under this general visible emission standard. It is expected that the opacity of all emissions from the diesel engines and cooling towers will be well below 40% at all times.

**Georgia Rule 391-3-1-.02(2)(d) for Fuel-burning Equipment** limits opacity, particulate matter (PM), and nitrogen oxides ($NO_x$) emissions from fuel-burning equipment. The diesel-fired engines do not meet the definition of "fuel-burning equipment" because the primary purpose of the engines is not to produce thermal energy. The engines are, therefore, not subject to Rule (d).

**Georgia Rule 391-3-1-.02(2)(e), Particulate Matter Emission from Manufacturing Processes,** commonly known as the process weight rate rule, limits PM emissions from manufacturing processes. The diesel-fired engines and the cooling towers are not considered "manufacturing processes". Therefore, Rule (e) does not apply to Plant Vogtle.

**Georgia Rule 391-3-1-.02(2)(g), Sulfur Dioxide,** applies to all "fuel burning" sources. The 13 diesel-fired engines are "fuel burning" sources. Rule (g) limits the fuel burned in these sources to no more than 2.5 percent sulfur by weight. Because the diesel fuel fired in these engines is limited to 0.0015% sulfur, the engines will easily comply with Rule (g).

### Federal Rule - PSD

The regulations for PSD in 40 CFR 52.21 require that any new major source or modification of an existing major source be reviewed to determine the potential emissions of all pollutants subject to regulations under the Clean Air Act. The PSD review requirements apply to any new or modified source which belongs to one of 28 specific source categories having potential emissions of 100 tons per year or more of any regulated pollutant, or to all other sources having potential emissions of 250 tons per year or more of any regulated pollutant. They also apply to any modification of a major stationary source which results in a significant net emission increase of any regulated pollutant.

Georgia has adopted a regulatory program for PSD permits, which the United States Environmental Protection Agency (EPA) has approved as part of Georgia's State Implementation Plan (SIP). This regulatory program is located in the Georgia Rules at 391-3-1-.02(7). This means that Georgia EPD issues PSD permits for new major sources pursuant to the requirements of Georgia's regulations. It also means that Georgia EPD considers, but is not legally bound to accept, EPA comments or guidance. A commonly used source of EPA guidance on PSD permitting is EPA's Draft October 1990 New Source Review Workshop Manual for Prevention of Significant Deterioration and Nonattainment Area Permitting (NSR Workshop Manual). The NSR Workshop Manual is a comprehensive guidance document on the entire PSD permitting process.

The PSD regulations require that any major stationary source or major modification subject to the regulations meet the following requirements:

- Application of BACT for each regulated pollutant that would be emitted in significant amounts;
- Analysis of the ambient air impact;
- Analysis of the impact on soils, vegetation, and visibility;
- Analysis of the impact on Class I areas; and
- Public notification of the proposed plant in a newspaper of general circulation

## Definition of BACT

The PSD regulation requires that BACT be applied to all regulated air pollutants emitted in significant amounts. Section 169 of the Clean Air Act defines BACT as an emission limitation reflecting the maximum degree of reduction that the permitting authority (in this case, EPD), on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such a facility through application of production processes and available methods, systems, and techniques. In all cases BACT must establish emission limitations or specific design characteristics at least as stringent as applicable New Source Performance Standards (NSPS). In addition, if EPD determines that there is no economically reasonable or technologically feasible way to measure the emissions, and hence to impose and enforceable emissions standard, it may require the source to use a design, equipment, work practice or operations standard or combination thereof, to reduce emissions of the pollutant to the maximum extent practicable.

EPA's NSR Workshop Manual includes guidance on the 5-step top-down process for determining BACT. In general, Georgia EPD requires PSD permit applicants to use the top-down process in the BACT analysis, which EPA reviews. The five steps of a top-down BACT review procedure identified by EPA per BACT guidelines are listed below:

Step 1: Identification of all control technologies;
Step 2: Elimination of technically infeasible options;
Step 3: Ranking of remaining control technologies by control effectiveness;
Step 4: Evaluation of the most effective controls and documentation of results; and
Step 5: Selection of BACT.

The following is a discussion of the applicable federal rules and regulations pertaining to the equipment that is the subject of this preliminary determination, which is then followed by the top-down BACT analysis.

## PM2.5 Surrogate

On May 8, 2008, EPA issued a rule that finalizes several NSR program requirements for sources that emit PM2.5 and other pollutants that contribute to PM2.5. The rule adopts a significant emission rate of 10 tons per year for direct PM2.5 emissions as well as other levels for pollutants that contribute to PM2.5 (including SO2, NOx, and VOC). However, the new rule contains a transition policy that suggests SIP-approved states may continue to use PM10 as a surrogate for PM2.5 in attainment areas until the state revises its SIP. The surrogate policy was initially stated in "Interim Implementation for the New Source Review Requirement for PM2.5" (Seitz Memorandum), October 23, 1997. Therefore, since Plant Vogtle is located in an attainment area for PM2.5 (Burke County), the new rule does not apply until Georgia revises its SIP.

PM2.5 can be emitted directly from a source or formed secondarily in the atmosphere from emissions of other compounds referred to as precursors. The new rule will eventually address both filterable and

condensable direct PM2.5 emissions. However, due to uncertainties in existing data for condensable PM2.5, the new PM2.5 rule contains a "transition period" during which NSR permits need not address direct condensable PM2.5 emissions. The transition period extends until 2011 or until sufficient advances are made in the test methods for measuring PM2.5 to enable accurate and reliable measurements. Directly emitted PM2.5 is addressed below while other pollutants that may contribute to PM2.5 are addressed in other respective sections of this BACT analysis.

In the RBLC for PM2.5, only three diesel-fired engine projects are listed. The Cornell Combined Heat & Power Project (RBLC Listing No. NY-0101) in New York lists a PM2.5 limit of 0.19 lb/hr, the Ingenco K&O Facility (RBLC Listing No. VA-0305) in Virginia lists a PM2.5 limit of 115.9 tons/yr, and Competitive Power Ventures (RBLC Listing No. MD-0040) in Maryland lists a PM2.5 limit of 0.15 g/hp-hr. The proposed PM10 limit for this permit are very similar to the PM2.5 limits for these other projects.

In addition to the above, the following considerations are provided to explain why EPD has determined that PM10 should serve as the surrogate for PM2.5 in this PSD determination:

There is a strong statistical relationship between PM10 and PM2.5 Emissions. PM2.5 is a subset of PM10; all PM2.5 will be included in PM10 evaluations. Further, there is a predictable correlation between PM2.5 and PM10 emissions and control efficiencies from emission units associated with the project, consistent under the range of operating scenarios and conditions expected. The degree of control for both PM10 and PM2.5 are influenced by the same control device operating parameters, such that proper operation of the control devices to minimize PM10 emissions (as well as additional control train equipment installed for other purposes) will simultaneously minimize PM2.5 emissions.

The BACT selected for PM10 is also the most effective technology (and would be considered BACT) for PM2.5 emissions.

US EPA has yet to established final values for PM2.5 significant impact level (SIL) or PSD Increment. In addition, EPA has yet to establish a final Minor Source Baseline Date. While EPA has recently proposed three possible values for these levels, the SIL and increment are likened to a moving target. If and when EPA sets the level, it may be any one of the proposed values, or a completely different value.

There is insufficient technical guidance from US EPA regarding measurement of PM2.5. There is not currently an accurate and accepted methodology for quantifying both filterable and condensable PM2.5 emissions for most types of emission sources. For filterable PM2.5, short of assuming all PM is PM2.5, there is no EPA-approved test method currently in place. This is particularly true for sources with stack emissions containing condensed water droplets. For condensable PM2.5, existing test methods have been shown to produce inconsistent and variable results that can also be biased high due to artifacts. For this reason, EPA chose to adopt a transition period in the final PM2.5 implementation rule during which PSD permits would not need to address condensable PM2.5 emissions. Due to the lack of accurate and available test methods, there is limited data available on PM2.5 emissions (both filterable and condensable) for most types of emission sources. While data that is available may be useful for defining general correlations and relationships between PM2.5 and other pollutants, it is not of sufficient quantity or accuracy for setting emission limits. This lack of information would not only affect the setting of PM2.5 BACT limits, but would make it impossible to build an accurate PM2.5 emissions inventory for contributing/nearby sources to be considered in any NAAQS or PSD Increment modeling.

Background concentrations of PM2.5 are not well established. While Georgia has begun a PM2.5 monitoring campaign, the data are not yet accurate enough to use as a background concentration when comparing to the PM2.5 NAAQS.

Georgia's SIP has yet to be amended to include PM2.5. EPA promulgated its final NSR/PSD implementation rule for PM2.5 in May 2008, but expressly recognized that use of the PM10 Surrogate Policy would be continued until SIP-approved permitting programs revise the SIP to include PM2.5. The

deadline for this revision is May 2011. EPA did not identify any technical prerequisites to application of the PM10 Surrogate Policy. In fact, EPA elected not to finalize a previously proposed option that would have required sources to demonstrate compliance with the PM2.5 NAAQS, because "partially implementing the PM10 Surrogate Policy in this manner would be confusing and difficult to administer."

## Federal Rule - New Source Performance Standards

**Subpart A (General Provisions)**
Subpart A imposes generally applicable provisions for initial notifications, initial compliance testing, monitoring, and record keeping requirements. Since the new diesel-fired engines at Plant Vogtle will be subject to one or more New Source Performance Standard, they will also be subject to Subpart A.

**Subpart Kb (Volatile Organic Liquid Storage Vessels)**
Subpart Kb applies to storage vessels containing volatile organic liquids (VOLs) with a capacity greater than 75 $m^3$ (approximately 19,800 gallons). The subpart, however, does not apply to vessels storing materials with a maximum true vapor pressure less than 3.5 kPa (approximately 0.51 pounds per square inch ambient). There are four proposed VOL vessels which will have storage greater than 75$m^3$. Since the vapor pressure of diesel fuel is below 3.5 kPa, the tanks are exempt from Subpart Kb.

**Subpart IIII (Stationary Compression Ignition Internal Combustion Engines)**
Subpart IIII applies to stationary diesel-fired internal combustion (IC) engines and sets the emission standards for NOx, CO, PM and NMHC, along with limiting SO2 through the use of low sulfur fuel. The regulation applies to the standby generators, fire-water pump engines, RWS and TSC generators, and the ancillary generators. The primary burden of the proposed regulation falls on the IC engine manufactures, rather than the owner/operators, since engine manufacturers must certify their 2007 model and later diesel-fired IC engines to the emission standards established in the rule, for all pollutants, for the same model year and maximum engine power. Starting with 2007 model year and later engines, owner/operators demonstrate compliance by purchasing engines certified by the manufacturer to meet the applicable emission standards, and keep the manufacturer's documentation showing the engines are certified.

## Federal Rule - National Emissions Standards For Hazardous Air Pollutants

**Subpart A (General Provisions)**
Subpart A imposes generally applicable requirements for initial notifications, initial compliance testing, monitoring, and record keeping requirements. Since the new diesel-fired engines at Plant Vogtle will be subject to one or more MACT standards, they will also be subject to Subpart A.

**Subpart Q (Industrial Process Cooling Towers)**
Subpart Q applies to all new and existing industrial process cooling towers that are operated with chromium-based water treatment chemicals and are either major sources or are integral parts of facilities that are major sources (40 CFR 63.400(a)). While this plant and the electric utility industry in general use cooling towers, they do not use chromium-based water treatment chemicals. Consequently, NESHAP Subpart Q will not apply to the cooling towers at this project.

**Subpart ZZZZ (Stationary Reciprocating Internal Combustion Engines)**
Subpart ZZZZ applies to new, reconstructed or existing stationary reciprocating internal combustion engines (RICE) at a major source or area source for Hazardous Air Pollutants. Plant Vogtle is a major source of HAPs; therefore, the proposed engines associated with the Vogtle Units 3&4 project are subject to Subpart ZZZZ. The proposed engines will be defined as New Stationary RICE. Compression Ignition (CI) stationary RICE less than or equal to 500 brake HP will comply with Subpart ZZZZ by meeting the requirements in 40 CFR 60 Subpart IIII (NSPS Stationary Compression Ignition Internal Combustion Engines). This citation will apply to the four (4) ancillary generators and the three (3) emergency fire pumps.

Internal Combustions engines greater than 500 brake HP which are not emergency or limited use must comply with emission limitations in Table 2a of Subpart ZZZZ of Part 63. The limitation in Table 2a requires a reduction of CO by 70% or more or to limit concentration of formaldehyde to 580 ppbvd or less at 15% Oxygen. This will apply to the four (4) standby generators and the RWS and TSC generators.

**Federal Rule – Acid Rain Rule**

The proposed fossil-fuel combustion devices (13 diesel-fired engines) included in this project will not be subject to the Title IV Acid Rain provisions since they are all less than 25 MW and they will not be used to generate electricity for sale.

**Federal Rule – Clean Air Interstate Rule (CAIR)**

The proposed fossil-fuel combustion devices (13 diesel-fired engines) included in this project will not be subject to CAIR since they are all less than 25 MW and they will not be used to generate electricity for sale.

**State and Federal – Startup and Shutdown and Excess Emissions**

Excess emission provisions for startup, shutdown, and malfunction are provided in Georgia Rule 391-3-1-.02(2)(a)7. Excess emissions from the Standby Generators (Source Codes: VD05 through VD08), the RWS Standby Generator (Source Code: ODG1), the TSC Standby Generator (Source Code: ODG2), the Ancillary Generators (Source Codes: AUX1 through AUX4), and the Emergency Fire Pumps (Source Codes: FPD3 through FPD5) associated with the proposed project would most likely result from a malfunction of the engines. The facility cannot anticipate or predict malfunctions. However, the facility is required to minimize emissions during periods of startup, shutdown, and malfunction.

**Federal Rule – 40 CFR 64 – Compliance Assurance Monitoring**

Under 40 CFR 64, the *Compliance Assurance Monitoring* Regulations (CAM), facilities are required to prepare and submit monitoring plans for certain emission units with the Title V application. The CAM Plans provide an on-going and reasonable assurance of compliance with emission limits. Under the general applicability criteria, this regulation applies to units that use a control device to achieve compliance with an emission limit and whose pre-controlled emissions levels exceed the major source thresholds under the Title V permitting program. Although other units may potentially be subject to CAM upon renewal of the Title V operating permit, such units are not being modified under the proposed project and need not be considered for CAM applicability at this time. Therefore, this applicability evaluation only addresses the Standby Generators (Source Codes: VD05 through VD08), the RWS Standby Generator (Source Code: ODG1), the TSC Standby Generator (Source Code: ODG2), the Ancillary Generators (Source Codes: AUX1 through AUX4), the Emergency Fire Pumps (Source Codes: FPD3 through FPD5), Service Water System Cooling Towers (Source Codes: SWS1 and SWS2), and Circulating Water Cooling Towers (Source Codes: CWT1 and CWT2). None employ an air pollution control devices; therefore, the CAM requirements are not triggered by the proposed modification.

## 4.0 CONTROL TECHNOLOGY REVIEW

The proposed project will result in emissions that are significant enough to trigger PSD review for the following pollutants: carbon monoxide (CO), volatile organic compounds (VOC), nitrogen oxides (NOx), particulate matter (PM) and PM10.

**Diesel-fired Engines – Background**

The Standby Generators (Source Codes: VD05 through VD08), the RWS Standby Generator (Source Code: ODG1), the TSC Standby Generator (Source Code: ODG2), the Ancillary Generators (Source Codes: AUX1 through AUX4), and the Emergency Fire Pumps (Source Codes: FPD3 through FPD5) are new diesel-fired generators that will be used to support the operation of new nuclear Unit 3 and 4. They will be used for critical activities when offsite power is not available, such as running cooling water pumps, etc.

Diesel-fired Engines – PM/PM10 Emissions

Applicant's Proposal
Plant Vogtle identified four technologies that can be used to reduce or minimize PM/PM10 emissions: Particulate Filters, Combustion Process Design, Ultra Low Sulfur Fuel Oil, and Proper Maintenance. Any of the identified technologies identified are potentially feasible for PM/PM10 control from these engines. The supplemental information submitted by Plant Vogtle on September 11, 2009 included: "without specific engine data it is not possible to analyze the economic justification of all of these potentially feasible control options. Accordingly, this application proposes limits that are among the lowest of the recently permitted facilities identified in the RBLC and will therefore require the use of the top level available and economically justifiable control technology."

EPD Review – PM/PM10 Control
The Division has reviewed the RBLC and the applicable federal rules (NSPS Subpart IIII and MACT Subpart ZZZZ). The PM limits proposed by Plant Vogtle and in this permit are consistent with lowest emission limits for PM.

Conclusion – PM/PM10 Control
PM emissions from Standby Generators are limited to 0.15 g/kW-hr, from the Ancillary Generators are limited to 0.40 g/kW-hr, and from the Emergency Fire Pumps are limited to 0.15 g/kW-hr. Emissions testing will be performed annually on the Standby Generators. Plant Vogtle is required to propose parameters (e.g., engine speed, air manifold pressure, ignition timing, etc.) to be monitored continuously on all engines to assure PM emissions are minimized. The BACT selection for the Standby Generators (VD05 through VD08, ODG1 and ODG2) is summarized in Table 4-1; the BACT selection for the Ancillary Generators (AUX1 through AUX4) is summarized in Table 4-2; and the BACT selection for the Emergency Fire Pumps (FPD3 through FPD5) is summarized in Table 4-3.

Diesel-fired Engines – CO Emissions

Applicant's Proposal
Plant Vogtle identified two technologies that can be used to reduce or minimize CO emissions: Combustion Process Design and Catalytic Oxidation. Each of the identified technologies identified are potentially feasible for CO control from these engines. The supplemental information submitted by Plant Vogtle on September 11, 2009 included: "without specific engine data it is not possible to analyze the economic justification of all of these potentially feasible control options. Accordingly, this application proposes limits that are among the lowest of the recently permitted facilities identified in the RBLC and will therefore require the use of the top level available and economically justifiable control technology."

EPD Review – CO Control

The Division has reviewed the RBLC and the applicable federal rules (NSPS Subpart IIII and MACT Subpart ZZZZ). The PM limits proposed by Plant Vogtle and in this permit are consistent with the lowest emission limits for CO.

Conclusion – CO Control

CO emissions from Standby Generators are limited to 0.85 g/kW-hr, from the Ancillary Generators are limited to 5.00 g/kW-hr, and from the Emergency Fire Pumps are limited to 1.44 g/kW-hr. Emissions testing will be performed annually on the Standby Generators. Plant Vogtle is required to propose parameters (e.g., engine speed, air manifold pressure, ignition timing, etc.) to be monitored continuously on all engines to assure CO emissions are minimized. The BACT selection for the Standby Generators (VD05 through VD08, ODG1 and ODG2) is summarized in Table 4-1; the BACT selection for the Ancillary Generators (AUX1 through AUX4) is summarized in Table 4-2; and the BACT selection for the Emergency Fire Pumps (FPD3 through FPD5) is summarized in Table 4-3.

Diesel-fired Engines – VOC Emissions

Applicant's Proposal

Plant Vogtle identified two technologies that can be used to reduce or minimize VOC emissions: Combustion Process Design and Catalytic Oxidation. Each of the identified technologies identified is potentially feasible for VOC control from these engines. The supplemental information submitted by Plant Vogtle on September 11, 2009 included: "without specific engine data it is not possible to analyze the economic justification of all of these potentially feasible control options. Accordingly, this application proposes limits that are among the lowest of the recently permitted facilities identified in the RBLC and will therefore require the use of the top level available and economically justifiable control technology."

EPD Review – VOC Control

The Division has reviewed the RBLC and the applicable federal rules (NSPS Subpart IIII and MACT Subpart ZZZZ). The PM limits proposed by Plant Vogtle and in this permit are consistent with lowest emission limits for VOC.

Conclusion – VOC Control

VOC emissions from Standby Generators are limited to 0.082 g/kW-hr, from the Ancillary Generators are limited to 0.75 g/kW-hr, and from the Emergency Fire Pumps are limited to 0.32 g/kW-hr. Emissions testing will be performed annually on the Standby Generators. Plant Vogtle is required to propose parameters (e.g., engine speed, air manifold pressure, ignition timing, etc.) to be monitored continuously on all engines to assure VOC emissions are minimized. The BACT selection for the Standby Generators (VD05 through VD08, ODG1 and ODG2) is summarized in Table 4-1; the BACT selection for the Ancillary Generators (AUX1 through AUX4) is summarized in Table 4-2; and the BACT selection for the Emergency Fire Pumps (FPD3 through FPD5) is summarized in Table 4-3.

Diesel-fired Engines – NOx Emissions

Applicant's Proposal

Plant Vogtle identified five technologies that can be used to reduce or minimize NOx emissions: Combustion Process Design, Non-Selective Catalytic Reduction (NSCR), Exhaust Gas Recirculation (with NSCR), Selective Catalytic Reduction, and EMx (SCONOx). EMx (SCONOx) is not considered applicable, because there have been no installations on a reciprocating engine. Each of the other identified technologies identified are potentially feasible for NOx control from these engines. The supplemental information submitted by Plant Vogtle on September 11, 2009 included: "without specific engine data it is not possible to analyze the economic justification of all of these potentially feasible control options. Accordingly, this application proposes limits that are among the lowest of the recently

permitted facilities identified in the RBLC and will therefore require the use of the top level available and economically justifiable control technology."

EPD Review – NOx Control

The Division has reviewed the RBLC and the applicable federal rules (NSPS Subpart IIII and MACT Subpart ZZZZ). The PM limits proposed by Plant Vogtle and in this permit are consistent with lowest emission limits for NOx.

Conclusion – NOx Control

NOx emissions from Standby Generators are limited to 1.60 g/kW-hr, from the Ancillary Generators are limited to 7.50 g/kW-hr, and from the Emergency Fire Pumps are limited to 3.25 g/kW-hr. Emissions testing will be performed annually on the Standby Generators. Plant Vogtle is required to propose parameters (e.g., engine speed, air manifold pressure, ignition timing, etc.) to be monitored continuously on all engines to assure NOx emissions are minimized. The BACT selection for the Standby Generators (VD05 through VD08, ODG1 and ODG2) is summarized in Table 4-1; the BACT selection for the Ancillary Generators (AUX1 through AUX4) is summarized in Table 4-2; and the BACT selection for the Emergency Fire Pumps (FPD3 through FPD5) is summarized in Table 4-3.

**Table 4-1: BACT Summary for the Standby Generators**

| Pollutant | Control Technology | Proposed BACT Limit | Averaging Time | Compliance Determination Method |
|---|---|---|---|---|
| PM/PM10 | Combustion control | 0.15 g/kw-hr | 3-hour | annual test, continuous parameter monitoring |
| CO | Combustion control | 0.85 g/kw-hr | 3-hour | annual test, continuous parameter monitoring |
| VOC | Combustion control | 0.082 g/kw-hr | 3-hour | annual test, continuous parameter monitoring |
| NOx | Combustion control | 1.60 g/kw-hr | 3-hour | annual test, continuous parameter monitoring |

**Table 4-2: BACT Summary for the Ancillary Generators**

| Pollutant | Control Technology | Proposed BACT Limit | Averaging Time | Compliance Determination Method |
|---|---|---|---|---|
| PM/PM10 | Combustion control | 0.40 g/kw-hr | 3-hour | continuous parameter monitoring |
| CO | Combustion control | 5.00 g/kw-hr | 3-hour | continuous parameter monitoring |
| VOC | Combustion control | 0.75 g/kw-hr | 3-hour | continuous parameter monitoring |
| NOx | Combustion control | 7.50 g/kw-hr | 3-hour | continuous parameter monitoring |

**Table 4-3: BACT Summary for the Emergency Fire Pumps**

| Pollutant | Control Technology | Proposed BACT Limit | Averaging Time | Compliance Determination Method |
|---|---|---|---|---|
| PM/PM10 | Combustion control | 0.15 g/kw-hr | 3-hour | continuous parameter monitoring |
| CO | Combustion control | 1.44 g/kw-hr | 3-hour | continuous parameter monitoring |
| VOC | Combustion control | 0.32 g/kw-hr | 3-hour | continuous parameter monitoring |
| NOx | Combustion control | 3.25 g/kw-hr | 3-hour | continuous parameter monitoring |

## Cooling Towers - Background

The Service Water System Cooling Towers (Source Codes: SWS1 and SWS2) provide cooling water to the component cooling water heat exchangers and the Circulating Water Cooling Towers (Source Codes: CWT1 and CWT2) dissipate waste heat from new nuclear Units 3 and 4. Water drops lost to the atmosphere contains dissolved solids, which become particulate matter when the water evaporates.

### Cooling Towers – PM/PM10 Emissions

Applicant's Proposal

The only feasible technology for controlling PM/PM10 from cooling towers is the use of drift eliminators. Drift eliminators rely on inertial separation caused by airflow direction changes to remove water droplets from the air stream leaving the tower.

EPD Review – PM/PM10 Control

The Division has reviewed the RBLC. The PM limits proposed by Plant Vogtle and in this permit are consistent with lowest emission limits for PM.

Conclusion – PM/PM10 Control

The Drift Loss Rate on the Service Water System Cooling Towers is limited to 0.005% and from the Circulating Water Cooling Towers is limited to 0.0005%. The BACT selection for the Service Water System Cooling Towers is summarized in Table 4-4, and the BACT selection for the Circulating Water Cooling Towers is summarized in Table 4-5.

**Table 4-4: BACT Summary for the Service Water System Cooling Towers**

| Pollutant | Control Technology | Proposed BACT Limit | Averaging Time | Compliance Determination Method |
|---|---|---|---|---|
| PM/PM10 | Drift eliminators | 0.005% Drift Loss Rate | N/A | Design specification |

**Table 4-5: BACT Summary for the Circulating Water Cooling Towers**

| Pollutant | Control Technology | Proposed BACT Limit | Averaging Time | Compliance Determination Method |
|---|---|---|---|---|
| PM/PM10 | Drift eliminators | 0.0005% Drift Loss Rate | N/A | Design specification |

## 5.0 TESTING AND MONITORING REQUIREMENTS

Testing Requirements:

The permit application states that the Standby Generators (VD05 through VD08), the RWS Standby Generator (ODG1), and the TSC Standby Generator (ODG2) are greater than 500 HP. Engines that exceed 500 HP are required to conduct initial and semiannual CO reduction or formaldehyde tests per the requirements of 40 CFR 63 Subpart ZZZZ. If two consecutive semiannual tests are in compliance, testing may be conducted on an annual basis. Since the permit application states that no control device will be used for these engines, a formaldehyde test is specified. If these engines are greater than or equal to 30 liters per cylinder, initial and annual testing for NOx and PM are required per 40 CFR 60 Subpart IIII. To ensure that the CO and VOC limits are met, testing is also required at the same frequency as the NOx and PM tests.

The federal rules (40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ) do not require any testing on the smaller engines, Ancillary Generators (AUX1 through AUX4) and Emergency Fire Pumps (FPD3 through FPD5). This permit, however, requires an initial test be conducted initially to ensure compliance with the BACT limits for NOx, CO, VOC, and PM.

Monitoring Requirements:

The Permittee is required to develop a monitoring protocol for to show compliance with the NOx and PM limit per 40 CFR 60 Subpart IIII. The Permittee is also required to develop a monitoring protocol for engines greater than 500 HP to show compliance with HAP standards per 40 CFR 63 Subpart ZZZZ. This permit extends this requirement for CO and VOC for the Standby Generators (VD05 through VD08), the RWS Standby Generator (ODG1), and the TSC Standby Generator (ODG2) and for NOx, PM, CO and VOC for the Ancillary Generators (AUX1 through AUX4) and Emergency Fire Pumps (FPD3 through FPD5) to demonstrate compliance with the BACT limits.

CAM Applicability:

Because none of the emission units will require a control device to meet their respective emission limits, CAM is not applicable and is not being triggered by the proposed modification. Therefore, no CAM provisions are being incorporated into the facility's permit.

## 6.0 AMBIENT AIR QUALITY REVIEW

An air quality analysis is required to determine the ambient impacts associated with the construction and operation of the proposed modifications. The main purpose of the air quality analysis is to demonstrate that emissions from the proposed modifications, in conjunction with other applicable emissions from existing sources (including secondary emissions from growth associated with the new project), will not cause or contribute to a violation of any applicable National Ambient Air Quality Standard (NAAQS) or PSD increment in a Class I or Class II area. NAAQS exist for $NO_2$, CO, $PM_{2.5}$, $PM_{10}$, $SO_2$, Ozone ($O_3$), and lead. PSD increments exist for $SO_2$, $NO_2$, and $PM_{10}$.

The proposed project at the Plant Vogtle triggers PSD review for $NO_x$, CO, VOC, and $PM_{10}$. An air quality analysis was conducted to demonstrate the facility's compliance with the NAAQS and PSD Increment standards for $NO_x$ and $PM_{10}$. An additional analysis was conducted to demonstrate compliance with the Georgia air toxics program. This section of the application discusses the air quality analysis requirements, methodologies, and results. Supporting documentation may be found in the Air Quality Dispersion Report of the application and in the additional information packages.

### Modeling Requirements

The air quality modeling analysis was conducted in accordance with Appendix W of Title 40 of the Code of Federal Regulations (CFR) §51, *Guideline on Air Quality Models*, and Georgia EPD's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions (Revised).*

The proposed project will cause net emission increases of $NO_x$, CO, VOC, and $PM_{10}$ that are greater than the applicable PSD Significant Emission Rates. Therefore, air dispersion modeling analyses are required to demonstrate compliance with the NAAQS and PSD Increment. VOC does not have established PSD modeling significance levels (MSL) (an ambient concentration expressed in either $\mu g/m^3$ or ppm). Modeling is not required for VOC emissions; however, the project will likely have no impact on ozone attainment in the area, based on data from the monitored levels of ozone in Richmond County and the level of emissions increases that will result from the proposed project. The southeast is generally $NO_X$ limited with respect to ground level ozone formation.

**Significance Analysis: Ambient Monitoring Requirements and Source Inventories**

Initially, a Significance Analysis is conducted to determine if the $NO_x$, CO, VOC, and $PM_{10}$ emissions increases at the Plant Vogtle would significantly impact the area surrounding the facility. Maximum ground-level concentrations are compared to the pollutant-specific U.S. EPA-established Significant Impact Level (SIL). The SIL for the pollutants of concern are summarized in Table 6-1.

If a significant impact (i.e., an ambient impact above the SIL) does not result, no further modeling analyses would be conducted for that pollutant for NAAQS or PSD Increment. If a significant impact does result, further refined modeling would be completed to demonstrate that the proposed project would not cause or contribute to a violation of the NAAQS or consume more than the available Class II Increment.

Under current U.S. EPA policies, the maximum impacts due to the emissions increases from a project are also assessed against monitoring *de minimis* levels to determine whether pre-construction monitoring should be considered. These monitoring *de minimis* levels are also listed in Table 6-1. If either the predicted modeled impact from an emission increase or the existing ambient concentration is less than the monitoring *de minimis* concentration, the permitting agency has the discretionary authority to exempt an applicant from pre-construction ambient monitoring. This evaluation is required for $NO_x$, CO, and $PM_{10}$.

If any off-site pollutant impacts calculated in the Significance Analysis exceed the SIL, a Significant Impact Area (SIA) would be determined. The SIA encompasses a circle centered on the facility with a radius extending out to (1) the farthest location where the emissions increase of a pollutant from the

project causes a significant ambient impact, or (2) a distance of 50 km, whichever is less. All sources within a distance of 50 km of the edge of a SIA are assumed to potentially contribute to ground-level concentrations within the SIA and would be evaluated for possible inclusion in the NAAQS and PSD Increment analyses. $PM_{2.5}$ does not yet have established SILs (3 options proposed on 9/12/07)

**Table 6-1: Summary of Modeling Significance Levels**

| Pollutant | Averaging Period | PSD Significant Impact Level (ug/m$^3$) | PSD Monitoring Deminimis Concentration (ug/m$^3$) |
|---|---|---|---|
| $PM_{10}$ | Annual | 1 | -- |
| | 24-Hour | 5 | 10 |
| $NO_X$ | Annual | 1 | 14 |
| CO | 8-Hour | 500 | 575 |
| | 1-Hour | 2000 | -- |

**NAAQS Analysis**

The primary NAAQS are the maximum concentration ceilings, measured in terms of total concentration of pollutant in the atmosphere, which define the "levels of air quality which the U.S. EPA judges are necessary, with an adequate margin of safety, to protect the public health." Secondary NAAQS define the levels that "protect the public welfare from any known or anticipated adverse effects of a pollutant." The primary and secondary NAAQS are listed in Table 6-2 below.

**Table 6-2: Summary of National Ambient Air Quality Standards**

| Pollutant | Averaging Period | NAAQS | |
|---|---|---|---|
| | | Primary / Secondary (ug/m$^3$) | Primary / Secondary (ppm) |
| $PM_{10}$ | Annual | *Revoked 12/17/06 | *Revoked 12/17/06 |
| | 24-Hour | 150 / 150 | -- |
| $PM_{2.5}$ | Annual | 15 / 15 | -- |
| | 24-Hour | 35 / 35 | -- |
| $NO_X$ | Annual | 100 / 100 | 0.053 / 0.053 |
| CO | 8-Hour | 10,000 / None | 9 / None |
| | 1-Hour | 40,000 / None | 35 / None |

If the maximum pollutant impact calculated in the Significance Analysis exceeds the SIL at an off-property receptor, a NAAQS analysis is required. The NAAQS analysis would include the potential emissions from all emission units at Plant Vogtle, except for units that are generally exempt from permitting requirements and are normally operated only in emergency situations. The emissions modeled for this analysis would reflect the results of the BACT analysis for the modified emission unit. Facility emissions would then be combined with the allowable emissions of sources included in the regional source inventory. The resulting impacts, added to appropriate background concentrations, would be assessed against the applicable NAAQS to demonstrate compliance. For an annual average NAAQS analysis, the highest modeled concentration among five consecutive years of meteorological data would be assessed, while the highest second-high impact would be assessed for the short-term averaging periods.

**PSD Increment Analysis**

The PSD Increments were established to "prevent deterioration" of air quality in certain areas of the country where air quality was better than the NAAQS. To achieve this goal, U.S. EPA established PSD Increments for certain pollutants. The sum of the PSD Increment concentration and a baseline concentration defines a "reduced" ambient standard, either lower than or equal to the NAAQS that must be met in an attainment area. Significant deterioration is said to have occurred if the change in emissions occurring since the baseline date results in an off-property impact greater than the PSD Increment (i.e., the increased emissions "consume" more that the available PSD Increment).

U.S. EPA has established PSD Increments for $NO_X$, $SO_2$, and $PM_{10}$; no increments have been established for CO or $PM_{2.5}$ (however, $PM_{2.5}$ increments are expected to be added soon). The PSD Increments are further broken into Class I, II, and III Increments. Plant Vogtle is located in a Class II area. The PSD Increments are listed in Table 6-3.

**Table 6-3: Summary of PSD Increments**

| Pollutant | Averaging Period | PSD Increment | |
|---|---|---|---|
| | | Class I (ug/m$^3$) | Class II (ug/m$^3$) |
| $PM_{10}$ | Annual | 4 | 17 |
| | 24-Hour | 8 | 30 |
| $NO_X$ | Annual | 2.5 | 25 |

To demonstrate compliance with the PSD Increments, the increment-affecting emissions (i.e., all emissions increases or decreases after the appropriate baseline date) from the facility and those sources in the regional inventory would be modeled to demonstrate compliance with the PSD Class II increment for any pollutant greater than the SIL in the Significance Analysis. For an annual average analysis, the highest incremental impact will be used. For a short-term average analysis, the highest second-high impact will be used.

The determination of whether an emissions change at a given source consumes or expands increment is based on the source classification (major or minor) and the time the change occurs in relation to baseline dates. The major source baseline date for $NO_X$ is February 8, 1988, and the major source baseline date for $SO_2$ and $PM_{10}$ is January 5, 1976. Emission changes at major sources that occur after the major source baseline dates affect Increment. In contrast, emission changes at minor sources only affect Increment after the minor source baseline date, which is set at the time when the first PSD application is completed in a given area, usually arranged on a county-by-county basis. The minor source baseline dates have been set for $PM_{10}$ and $SO_2$ as January 30, 1980, and for $NO_2$ as April 12, 1991.

## Modeling Methodology

Details on the dispersion model, including meteorological data, source data, and receptors can be found in EPD's PSD Dispersion Modeling and Air Toxics Assessment Review in Appendix C of this Preliminary Determination and in Section 7.0 of the permit application.

## Modeling Results

Table 6-4 show that the proposed project will not cause ambient impacts of CO above the appropriate SIL. Because the emissions increases from the proposed project result in ambient impacts less than the SIL, no further PSD analyses were conducted for CO. However, ambient impacts above the SILs were predicted for NOx for the annual averaging period and $PM_{10}$ for the 24-hour averaging period, requiring NAAQS and Increment analyses be performed for $NO_x$ and $PM_{10}$.

**Table 6-4: Class II Significance Analysis Results – Comparison to SILs**

| Pollutant | Averaging Period | Year | UTM East (km) | UTM North (km) | Maximum Impact (ug/m$^3$) | SIL (ug/m$^3$) | Significant? |
|---|---|---|---|---|---|---|---|
| $NO_2$ | Annual | 2006 | 427.100 | 3666.500 | 3.83 | 1 | **Yes** |
| $PM_{10}$ | 24-hour | 2006 | 426.700 | 3666.700 | 7.10 | 5 | **Yes** |
| | Annual | 2006 | 427.079 | 3666.550 | 0.52 | 1 | No |
| CO | 1-hour | 2006 | 430.529 | 3667.071 | 1636.39 | 2000 | No |
| | 8-hour | 2006 | 430.700 | 3666.700 | 400.46 | 500 | No |

Data for worst year provided only.

As indicated in the tables above, maximum modeled impacts were below the corresponding SILs for CO. However, maximum modeled impacts were above the SILs for $NO_x$ for the annual averaging period and $PM_{10}$ for the 24-hour averaging period. Therefore, a Full Impact Analysis was conducted for $NO_x$ for the annual averaging period and $PM_{10}$ for the 24-hour averaging period.

**Significant Impact Area**

For any off-site pollutant impact calculated in the Significance Analysis that exceeds the SIL, a Significant Impact Area (SIA) must be determined. The SIA encompasses a circle centered on the facility being modeled with a radius extending out to the lesser of either: 1) the farthest location where the emissions increase of a pollutant from the proposed project causes a significant ambient impact, or 2) a distance of 50 kilometers. All sources of the pollutants in question within the SIA plus an additional 50 kilometers are assumed to potentially contribute to ground-level concentrations and must be evaluated for possible inclusion in the NAAQS and Increment Analysis.

Based on the results of the Significance Analysis, the distance between the facility and the furthest receptor from the facility that showed a modeled concentration exceeding the corresponding SIL was determined to be less than 3.7 kilometers for $PM_{10}$ and less than 4.9 kilometers for $NO_x$. To be conservative, regional source inventories for both of these pollutants were prepared for sources located within 53.7 kilometers of the facility for $PM_{10}$ and within 54.9 kilometers for $NO_x$.

**NAAQS and Increment Modeling**

The next step in completing the NAAQS and Increment analyses was the development of a regional source inventory. Nearby sources that have the potential to contribute significantly within the facility's SIA are ideally included in this regional inventory. Plant Vogtle requested and received an inventory of NAAQS and PSD Increment sources from Georgia EPD. Plant Vogtle reviewed the data received and calculated the distance from the plant to each facility in the inventory. All sources more than 50 km outside the SIA were excluded. According to Section 7.3.3.6 of the permit application, the emission inventory for the portions of South Carolina included in the modeling were coordinated and provided by John Glass of SC DHEC.

The distance from the facility of each source listed in the regional inventories was calculated, and all sources located more than 54.9 kilometers from the plant were excluded from the analysis. Additionally, pursuant to the "20D Rule," facilities outside the SIA were also excluded from the inventory if the entire facility's emissions (expressed in tons per year) were less than 20 times the distance (expressed in kilometers) from the facility to the edge of the SIA. In applying the 20D Rule, facilities in close proximity to each other (within approximately 5 kilometers of each other) were considered as one source. Then, any Increment consumers from the provided inventory were added to the permit application forms or other readily available permitting information.

The regional source inventory used in the analysis is included in the permit application and the attached modeling report.

**NAAQS Analysis**

In the NAAQS analysis, impacts within the facility's SIA due to the potential emissions from all sources at the facility and those sources included in the regional inventory were calculated. Since the modeled ambient air concentrations only reflect impacts from industrial sources, a "background" concentration was added to the modeled concentrations prior to assessing compliance with the NAAQS.

The results of the NAAQS analysis are shown in Table 6-5. For the short-term averaging periods, the impacts are the highest second-high impacts. For the annual averaging period, the impacts are the highest impact. When the total impact at all significant receptors within the SIA are below the corresponding NAAQS, compliance is demonstrated.

**Table 6-5: NAAQS Analysis Results**

| Pollutant | Averaging Period | Year | UTM East (km) | UTM North (km) | Maximum Impact ($ug/m^3$) | Background ($ug/m^3$) | Total Impact ($ug/m^3$) | NAAQS ($ug/m^3$) | Exceed NAAQS? |
|---|---|---|---|---|---|---|---|---|---|
| $NO_2$ | Annual | 2006 | 429.723 | 3667.824 | 7.01 | 14 | 21.01 | 100 | No |
| $PM_{10}$ | 24-hour | 2006 | 428.655 | 3665.280 | 25.03 | 38 | 63.03 | 150 | No |
| | Annual | 2006 | 429.659 | 3667.898 | 4.06 | 20 | 24.06 | 50 | No |

Data for worst year provided only.

As indicated in Table 6-5 above, all of the total modeled impacts at all significant receptors within the SIA are below the corresponding NAAQS.

**Increment Analysis**

The modeled impacts from the NAAQS run were evaluated to determine whether compliance with the Increment was demonstrated. The results are presented in Table 6-6.

**Table 6-6: Increment Analysis Results**

| Pollutant | Averaging Period | Year | UTM East (km) | UTM North (km) | Maximum Impact ($ug/m^3$) | Increment ($ug/m^3$) | Exceed Increment? |
|---|---|---|---|---|---|---|---|
| $NO_2$ | Annual | 2006 | 429.723 | 3667.824 | 4.50 | 25 | No |
| $PM_{10}$ | 24-hour | 2006 | 429.481 | 3668.162 | 23.92 | 30 | No |
| | Annual | 2006 | 429.659 | 3667.898 | 3.30 | 17 | No |

Data for worst year provided only

Table 6-6 demonstrates that the impacts are below the corresponding increments for NOx for the annual averaging period and PM10 for the 24-hour and annual averaging periods even with the conservative modeling assumption that all NAAQS sources were Increment sources.

**Ambient Monitoring Requirements**

**Table 6-7: Significance Analysis Results – Comparison to Monitoring *De Minimis* Levels**

| Pollutant | Averaging Period | Year* | UTM East (km) | UTM North (km) | Monitoring De Minimis Level ($ug/m^3$) | Modeled Maximum Impact ($ug/m^3$) | Significant? |
|---|---|---|---|---|---|---|---|
| $NO_2$ | Annual | 2006 | 427.100 | 3666.500 | 14 | 3.83 | No |
| $PM_{10}$ | 24-hour | 2006 | 426.700 | 3666.700 | 10 | 7.10 | No |
| CO | 8-hour | 2006 | 426.700 | 3666.700 | 575 | 400.46 | No |

Data for worst year provided only

The impacts for $NO_X$, CO, $SO_2$, and $PM_{10}$ quantified in Table 6-4 of the Class I Significance Analysis are compared to the Monitoring *de minimis* concentrations, shown in Table 6-1, to determine if ambient monitoring requirements need to be considered as part of this permit action. Because all maximum modeled impacts are below the corresponding de minimis concentrations, no pre-construction monitoring is required for $NO_2$, $PM_{10}$, $SO_2$, or CO.

As noted previously, the VOC *de minimis* concentration is mass-based (100 tpy) rather than ambient concentration-based (ppm or $\mu g/m^3$). Projected VOC emissions increases resulting from the proposed modification is less than 100 tpy.

**Class I Area Analysis**

Federal Class I areas are regions of special national or regional value from a natural, scenic, recreational, or historic perspective. Class I areas are afforded the highest degree of protection among the types of areas classified under the PSD regulations. U.S. EPA has established policies and procedures that generally restrict consideration of impacts of a PSD source on Class I Increments to facilities that are located near a federal Class I area. Historically, a distance of 100 km has been used to define "near", but more recently, a distance of 200 kilometers has been used for all facilities that do not combust coal.

The two Class I areas within approximately 200 kilometers of the Plant Vogtle are the Cape Romain Wilderness Area, located approximately 200 kilometers east of the facility, and the Wold Island Wilderness Area, located approximately 200 kilometers south of the facility. The U.S. Fish and Wildlife Service (FWS) is the designated Federal Land Manager (FLM) responsible for oversight of all three of these Class I areas.

**Table 6-8: Class I Significance Analysis Results – Cape Romain Wilderness Area**

| Pollutant | Averaging Period | Year | UTM East (km) | UTM North (km) | Maximum Projected Concentration ($ug/m^3$) | Significance Level ($ug/m^3$) | Significant? |
|---|---|---|---|---|---|---|---|
| $NO_2$ | Annual | 2006 | 478.096 | 3664.505 | 0.033 | 0.1 | No |
| $PM_{10}$ | 24-hour | 2006 | 426.700 | 3663.459 | 0.224 | 0.3 | No |
| | Annual | 2006 | 478.034 | 3663.459 | 0.011 | 0.2 | No |

**Table 6-9: Class I Significance Analysis Results – Wolf Island Wilderness Area**

| Pollutant | Averaging Period | Year | UTM East (km) | UTM North (km) | Maximum Projected Concentration ($ug/m^3$) | Significance Level ($ug/m^3$) | Significant? |
|---|---|---|---|---|---|---|---|
| $NO_2$ | Annual | 2006 | 441.096 | 3618.651 | 0.019 | 0.1 | No |
| $PM_{10}$ | 24-hour | 2006 | 438.038 | 3617.934 | 0.085 | 0.3 | No |
| | Annual | 2006 | 437.010 | 3617.737 | 0.006 | 0.2 | No |

## 7.0 ADDITIONAL IMPACT ANALYSES

PSD requires an analysis of impairment to visibility, soils, and vegetation that will occur as a result of a modification to the facility and an analysis of the air quality impact projected for the area as a result of the general commercial, residential, and other growth associated with the proposed project.

Soils and Vegetation

The EPA has developed a set of screening concentrations for evaluation of project impacts on soils and vegetation. These screening concentrations are contained in the EPA document entitled "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals" (EPA-450/2-81-078). The CO screening concentration is 1,800,000 µg/m3 based on a one-week exposure period. The NOx screening concentrations are 94 µg/m3, 564 µg/m3, 3,760 µg/m3, and 3,760 µg/m3 based on annual, 1-month, 8-hour, and 4-hour exposures, respectively. According to the analysis provided by the Applicant, the maximum predicted 24-hour CO concentration is 206.0 µg/m3, and the maximum NOx concentrations are 3.83 µg/m3, 9.93 µg/m3, 177.15 µg/m3, and 350.90 µg/m3, based on annual, 1-month, 8-hour, and 4-hour exposures, respectively. Based on a comparison of these maximum predicted concentrations to the screening concentration, EPD concludes that the projected NOx and CO emissions will not adversely affect soils or vegetation

Growth

A growth analysis examines the potential emissions from secondary sources associated with the proposed project. While these activities are not directly involved in project operation, the emissions involve those that can reasonably be expected to occur; for instance, industrial, commercial, and residential growth that will occur in the project area due to the project itself. Secondary emissions do not include any emissions which come directly from a mobile source, such as emissions from on-road motor vehicles or the propulsion of trains (USEPA 1990). They also do not include sources that do not impact the same general area as the source under review. Due to the fact that the project site is not immediately adjacent to a labor force that would serve the plant or any facilities that would support a town, the emissions due to any residential growth will not impact the project area and will not be included in the growth analysis. The construction period will feature a transient work force that does not contribute substantially to long-term growth. The workforce for both construction and operation of the plant will be within commuting distance of the plant, but the air quality impacts due to this work force commuting will be distant from the project and spread out over a large area.

Visibility

There are no sensitive receptors within the significant impact area (SIA) of Plant Vogtle. Therefore, as recommended by GA EPD in their Protocol response letter dated November 19, 2008, no visibility impairment analysis was required.

**Georgia Toxic Air Pollutant Modeling Analysis**

Georgia EPD regulates the emissions of toxic air pollutant (TAP) emissions through a program covered by the provisions of *Georgia Rules for Air Quality Control*, 391-3-1-.02(2)(a)3.(ii). A TAP is defined as any substance that may have an adverse effect on public health, excluding any specific substance that is covered by a State or Federal ambient air quality standard. Procedures governing the Georgia EPD's review of TAP emissions as part of air permit reviews are contained in the agency's "*Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions (Revised).*"

**Selection of Toxic Air Pollutants for Modeling**

For projects with quantifiable increases in TAP emissions, an air dispersion modeling analysis is generally performed to demonstrate that off-property impacts are less than the established Acceptable Ambient Concentration (AAC) values. The TAP evaluated are restricted to those that may increase due to the proposed project. Thus, the TAP analysis would generally be an assessment of off-property impacts due to facility-wide emissions of any TAP emitted by a facility. To conduct a facility-wide TAP impact evaluation for any pollutant that could conceivably be emitted by this facility is impractical. A literature review suggests that at least one molecule of hundreds of organic and inorganic chemical compounds could be emitted from the various combustion units. This is understandable given the nature of the diesel fuel fed to the combustion sources, and the fact that there are complex chemical reactions and combustion of fuel taking place in some. The vast majority of compounds potentially emitted however are emitted in only trace amounts that are not reasonably quantifiable.

For each TAP identified for further analysis, both the short-term and long-term AAC were calculated following the procedures given in Georgia EPD's *Guideline*. Figure 8-3 of Georgia EPD's *Guideline* contains a flow chart of the process for determining long-term and short-term ambient thresholds. Plant Vogtle referenced the resources previously detailed to determine the long-term (i.e., annual average) and short-term AAC (i.e., 24-hour or 15-minute). The AACs were verified by the EPD.

**Toxic Air Pollutant Modeling Results**

Georgia EPD used the ISCST3 dispersion model to re-evaluate the modeling submitted by Plant Vogtle. Details of the modeling can be found in EPD'S PSD Dispersion Modeling and Air Toxics Assessment Review in Appendix C of this Preliminary Determination and in Section 7.5.6 of the permit application. All modeled TAP concentrations were found to be less than the established Acceptable Ambient Concentration (AAC) values.

## 8.0 EXPLANATION OF DRAFT PERMIT CONDITIONS

The permit requirements for this proposed facility are included in draft Permit Amendment No. 4911-033-0030-V-02-3.

Section 1.0: Facility Description

This permit modification is for the installation of new emission units associated with two new nuclear power generation units scheduled for construction on the existing Vogtle site. The new emission units are supplemental equipment used in the operational and safety systems of the nuclear units. The electricity provided to the grid is exclusively provided by the nuclear power generating units. The existing emission units are not being modified.

Section 2.0: Requirements Pertaining to the Entire Facility

No conditions in Section 2.0 are being added, deleted or modified as part of this permit action.

Section 3.0: Requirements for Emission Units

Condition 3.3.5 was added stating that the new diesel-fired engines are subject to the Stationary Compression Ignition Internal Combustion Engines NSPS (Subpart IIII) and the General Provisions to NSPS (Subpart A).

Condition 3.3.6 was added stating that the new diesel-fired engines are subject to the Stationary Reciprocating Internal Combustion Engines MACT (Subpart ZZZZ) and the General Provisions to the MACT Standards (Subpart A).

Condition 3.3.7 was added limiting emissions, from the Standby Generators, of VOC, CO, NOx, and PM per BACT and NSPS Subpart IIII and formaldehyde per MACT Subpart ZZZZ.

Condition 3.3.8 was added limiting emissions of VOC, CO, NOx, and PM from the Ancillary Generators per BACT and NSPS Subpart IIII.

Condition 3.3.9 was added limiting emissions of VOC, CO, NOx, and PM from the Emergency Fire Pumps per BACT and NSPS Subpart IIII

Condition 3.3.10 was added establishing the fuel sulfur limit for the diesel fuel burned in the new engines per NSPS Subpart IIII.

Conditions 3.3.11 and 3.3.12 were added establishing that the engines must be installed and operated using the manufacturer's written instructions and that only changes approved by the manufacturer may be made per the requirements of NSPS Subpart IIII.

Conditions 3.3.13 and 3.3.14 specify the maximum drift loss rate for the new cooling towers per BACT.

Section 4.0: Requirements for Testing

Condition 4.1.3 was modified by adding the appropriate test methods for measuring NOx, CO, VOC, and formaldehyde

Condition 4.2.1 was added requiring initial performance tests on the Standby Generators for formaldehyde per MACT Subpart ZZZZ, NOx and PM per NSPS Subpart IIII and PSD, and VOC and CO per PSD.

Condition 4.2.2 was added requiring initial performance tests on the Ancillary Generators and the Emergency Fire Pumps for VOC, NOx, CO, and PM per PSD.

Condition 4.2.3 was added requiring semiannual tests for formaldehyde on the Standby Generators, which may be reduced to annual, per the requirements of MACT Subpart ZZZZ.

Condition 4.2.4 was added requiring annual tests on the Standby Generators for NOx and PM (per NSPS Subpart IIII and PSD) and for CO and VOC (per PSD).

Condition 4.2.5 was added requiring establishment of monitoring ranges for the Standby Generators during the initial performance test. The monitoring range for formaldehyde is required per MACT Subpart ZZZZ; the monitoring ranges for NOx and PM are required per NSPS Subpart IIII and PSD; and the monitoring ranges for VOC and CO are required per PSD.

Condition 4.2.6 was added requiring establishment of monitoring ranges for the Ancillary Generators and the Emergency Fire Pumps per PSD.

Section 5.0: Requirements for Monitoring

Condition 5.2.2 was added requiring the Permittee to propose one or more parameters to monitor from the Standby Generators to monitor continuously to assure compliance with the limits for formaldehyde (per MACT Subpart ZZZZ), NOx and PM (per NSPS Subpart IIII and PSD), and VOC and CO (per PSD).

Condition 5.2.3 was added requiring the Permittee to propose one or more parameters to monitor from the Ancillary Generators and the Emergency Fire Pumps per PSD.

Section 6.0: Other Recordkeeping and Reporting Requirements

Condition 6.2.5 requires the Permittee notify the Division of the date construction is commenced and provide the information specified in 40 CFR 60.4214(a)(1).

Condition 6.2.6 requires the Permittee keep records of the information required in 40 CFR 60.4214(a)(2).

Condition 6.2.7 requires the Permittee notify the Division of the actual date of startup in accordance with 40 CFR 60.7(a)(3).

Section 7.0: Other Specific Requirements

No conditions in Section 7.0 are being added, deleted or modified as part of this permit action

# APPENDIX A

Draft Revised Title V Operating Permit Amendment
Vogtle Electric Generating Plant
Waynesboro (Burke County), Georgia

# APPENDIX B

Vogtle Electric Generating Plant PSD Permit Application and Supporting Data

Contents Include:

1. PSD Permit Application No. 18986, dated May 27, 2009
2. Additional Information Package Dated September 11, 2009

# APPENDIX C

## EPD'S PSD Dispersion Modeling and Air Toxics Assessment Review